

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Lake Herman, Lake County
2102-F-21-R-48
2015



Figure 1. Lake Herman, Lake County

Legal Description: T106N- R53W- Sec.10-11,14-15, 22-23

Location from nearest town: 2 miles west of Madison, SD

Surface Area: 1,287 acres

Meandered (Y/N): Yes

OHWM elevation: 1,669.0

Outlet elevation: 1,668.4

Max. depth at outlet elevation: 13 feet

Observed water level: Full

Contour map available (Y/N): Yes

Watershed area: 36,275 acres

Shoreline length: 9.5 miles

Date set: October, 1981

Date set: October, 1981

Mean depth at outlet elevation: 4.7 feet

Lake volume: 7,425 acre feet

Date mapped: 2002

DENR beneficial use classifications: (6) warmwater semipermanent fish propagation and irrigation (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

General

Lake Herman is a natural lake and the first in a chain of four lakes including Lake Madison, Round Lake and Brant Lake. It is believed that Herman Luce, an early settler in the area, named the lake for himself when he built his home in the timbered area on the east side of the lake in June, 1870. The log cabin Mr. Luce built is still standing and on display in Lake Herman State Park.

Ownership of Lake and Adjacent Lakeshore Properties

Lake Herman is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The South Dakota Department of Game, Fish, and Parks (GFP) owns and manages a State Park on the east side of the lake and a Lake Access Area on the west side. The remainder of the shoreline is privately owned and heavily developed.

Fishing Access

Lake Herman State Park East Access Area contains a double lane boat ramp, boat dock, picnic tables, comfort stations, and full service and primitive campgrounds. There are many areas suitable for shore fishing. The West Lake Access Area contains a single lane boat ramp, boat dock and a vault toilet. Shoreline access is limited at this area due to high banks. There is also considerable shoreline access available along the county road that runs around the north shore. In addition, there is a new concrete fishing platform on the outlet structure on the northeast corner of the lake.

Water Quality and Aquatic Vegetation

The watershed for Lake Herman extends northwest, west and southwest of the lake and is very large, encompassing 30,000-40,000 acres. Watershed topography is mostly rolling hills and the primary land use is row crop agriculture, pasture and urban development. Decades of sedimentation from the watershed have reduced mean water depth to 4.7 feet and as a result, the lake becomes very turbid during periods of high winds.

Water clarity was poor during the 2015 survey as it commonly has been for the last 10 years (Table 1). In addition to wind-driven turbidity, rough fish abundance and algae blooms fueled by high nutrient loading also contribute to generally poor water clarity.

Table 1. Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in Lake Herman, Lake County, 2006-2015.

Year	Water Temp °C (°F)	Secchi Depth cm (in)	Observations/Comments (algae, aquatic vegetation, water quality, etc.)
2015	27 (80)	69 (27)	Some algae
2014	-- (--)	53 (21)	No observations were recorded
2013	28 (82)	114 (45)	No observations were recorded
2012	28 (82)	30 (12)	No observations were recorded
2011	29 (84)	122 (48)	Sago pondweed
2010	27 (80)	51 (20)	Algae bloom, sago pondweed
2009	20 (68)	150 (59)	No vegetation
2007	24 (75)	61 (24)	Some cattails

Fish Community

Lake Herman has a diverse fish community consisting of many different species. Black bullhead, common carp, bigmouth buffalo, white sucker and white bass are the most abundant species found in the lake. The abundance of game fish species is generally low due to inadequate water depth, poor water quality, competition from rough fish species and the lack of abundant natural habitat.

Table 2. Fish species commonly found in Lake Herman, Lake County.

Game Species	Other Species
Walleye	Bigmouth Buffalo
Yellow Perch	Common Carp
White Bass	White Sucker
Black Crappie	
Northern Pike	
Bluegill	
Channel Catfish	
Smallmouth Bass	
Black Bullhead	
Green Sunfish	

Fish Management

Fish kills (summer or winter, Table 3) are relatively rare and not severe. The operation of an aeration system by the Lake Herman Development Association during the winter likely helps to prevent severe winter fish kills.

Walleye and yellow perch stocking efforts (Table 4) have generally been unsuccessful at producing high-yield fisheries, but they have produced enough fish to sustain some seasonal opportunity, especially for shore anglers. In years when white bass produce large age-0 year classes, the competition for forage likely slows the growth of age-0 walleyes and reduces their chance of surviving the winter.

Table 3. Fish kill history for Lake Herman, Lake County.

Year	Severity	Notes
2003	Light	9/3/03 – 1,000s FHM, 1 WAE, 1 WHS
1999	Light	July – minor carp kill in Dirk's Bay
1995	Moderate	Partial winterkill of larger WAE and COC

Table 4. Stocking history for Lake Herman, Lake County, 2006-2015.

Year	Number	Species	Size
2007	1,400,000	Walleye	Fry
2008	1,400,000	Walleye	Fry
2009	7,539,000	Yellow Perch	Fry
2010	1,312	Walleye	Large Fingerling
2011	135,790	Walleye	Fingerling
2012	130,130	Walleye	Fingerling
2013	135,200	Walleye	Fingerling
2014	95,920	Walleye	Fingerling
2015	337,604	Walleye	Fry

Methods

Lake Herman was sampled on July 14-15, 2015 with three overnight gill-net sets. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting.

Results and Discussion

Net Catch Results

Black bullheads and white suckers made up 75% of the gill net catch (Table 5). Yellow perch and walleye were the most abundant game fish sampled, followed by white bass and northern pike (Table 5).

Table 5. Total catch from three overnight gill net sets at Lake Herman, Lake County July 14-15, 2015.

Species	#	%	CPUE¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	120	56.6	40.0	± 14.8	20.1	97	8	--
White Sucker	39	18.4	13.0	± 6.8	10.3	97	97	--
Yellow Perch	25	11.8	8.3	± 6.0	15.3	40	36	105
Walleye	20	9.4	6.7	± 2.8	6.8	--	--	--
White Bass	6	2.8	2.0	± 1.5	6.1	--	--	--
Northern Pike	2	0.9	0.7	± 0.4	1.2	--	--	--

*10 years (2006-2015)

¹ See Appendix A for definitions of CPUE, PSD, RSD, RSD-P and mean Wr.

Table 6. Catch per unit effort by length category for various fish species captured with gill nets in Lake Herman July 14-15, 2015.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Bullhead	--	40.0	1.3	35.7	3.0	40.0	+14.8
White Sucker	--	13.0	0.3	--	12.7	13.0	+6.8
Yellow Perch	--	8.3	5.0	0.3	3.0	8.3	+6.0
Walleye	5.7	1.0	0.7	0.3	--	6.7	+2.8
White Bass	--	2.0	0.3	0.3	1.3	2.0	+1.5
Northern Pike	--	0.7	0.3	0.3	--	0.7	+0.4

Length categories can be found in Appendix A.

Table 7. Gill-net CPUE for all fish species sampled in Lake Herman, Lake County, 2006-2015.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bigmouth Buffalo		0.3		--	0.8	0.3	0.8	1.3	8.7	--
Black Bullhead		1.7		6.0	14.0	18.0	33.5	12.3	35.0	40.0
Channel Catfish		--		1.0	0.3	0.3	1.0	--	0.3	--
Common Carp		0.3		--	--	12.0	1.8	1.3	1.3	--
Green Sunfish		--		--	--	--	0.3	--	--	--
Northern Pike		0.7		1.3	1.3	2.3	1.8	--	1.3	0.7
Smallmouth Bass		--		--	--	0.3	--	--	--	--
Walleye		12.0		2.7	5.0	6.0	13.3	2.3	6.0	6.7
White Bass		2.7		3.3	1.5	1.3	32.8	0.7	4.3	2.0
White Sucker		15.3		15.0	13.0	10.0	4.5	5.0	6.7	13.0
Yellow Perch		4.3		14.7	31.0	26.3	33.3	0.7	4.0	8.3

Walleye

Management Objective

- maintain a walleye population with a total gill-net CPUE of at least 10

Management Strategy

- stock walleye fry at the rate of 500/acre (643,500) as needed to achieve the management objective

Walleye CPUE (Table 8) remains below the management objective despite six consecutive years of fingerling or fry stocking (Table 9). Fish from multiple year classes were sampled. Natural reproduction or a successful small fingerling stocking in 2014 has produced the largest year class in the last 5 years (Figures 2, 3).

Table 8. Gill-net CPUE, PSD, RSD-P, and mean Wr for all walleyes sampled in Lake Herman, Lake County, 2006-2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CPUE		12.0		2.7	5.0	6.0	13.3	2.3	6.0	6.7
PSD		8		--	28	56	58	--	67	--
RSD-P		3		--	0	11	8	--	17	--
Mean Wr		86		--	84	86	92	--	94	--

Table 9. Walleye stocked into Lake Herman, Lake County, 2006-2015.

Year	Number	Size
2015	337,604	Fry
2014	95,920	Small Fingerling
2013	135,200	Small Fingerling
2012	130,130	Small Fingerling
2011	135,790	Small Fingerling
2010	1,312	Large Fingerling
2008	1,400,000	Fry
2007	1,400,000	Fry

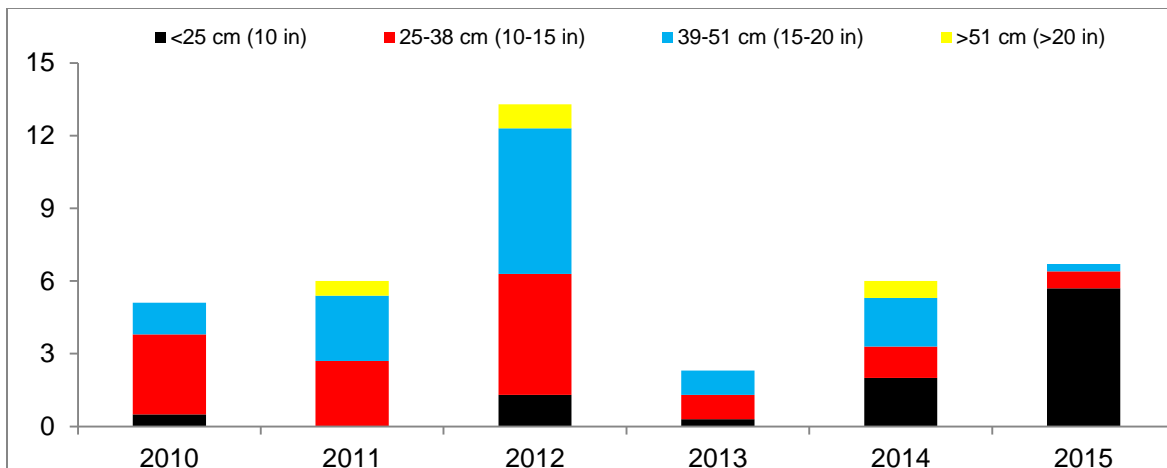


Figure 2. CPUE by length category for walleye sampled with gill nets in Lake Herman, Lake County, 2010-2015.

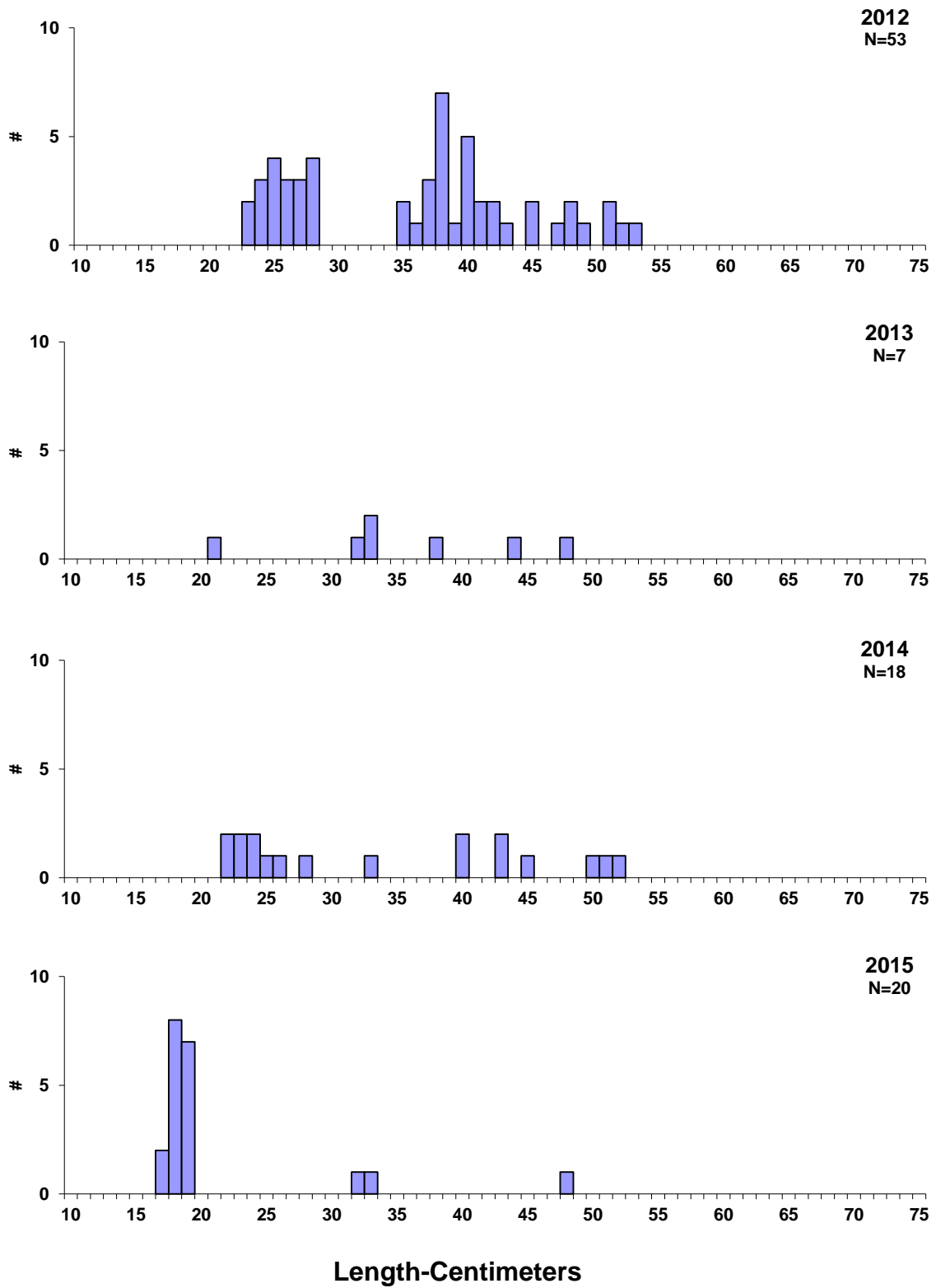


Figure 3. Length frequency histograms for walleye sampled with gill nets in Lake Herman, Lake County, 2012, 2013, 2014, 2015.

Yellow Perch

Management Objective

- none at this time

Management Strategies

- monitor the yellow perch population during annual lake surveys and report the results
- yellow perch fry or fingerling stocking is currently being evaluated and may be a potential future strategy to supplement natural reproduction

Yellow perch CPUE increased from 2014, but was still well below CPUEs recorded from 2009 through 2012 (Table 10). All yellow perch sampled in 2014 were stock length or longer (Table 10) and in excellent condition (Table 10).

Table 10. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for Lake Herman, Lake County, 2006-2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CPUE		4.3		14.7	31.0	26.3	33.3	0.7	4.0	8.3
PSD		100		88	51	41	71	--	100	40
RSD-P		69		0	45	0	3	--	0	36
Mean Wr		100		106	106	102	90	--	99	105

Table 11. Yellow perch stocked into Lake Herman, Lake County, 2006-2015.

Year	Number	Size
2009	7,539,000	Fry

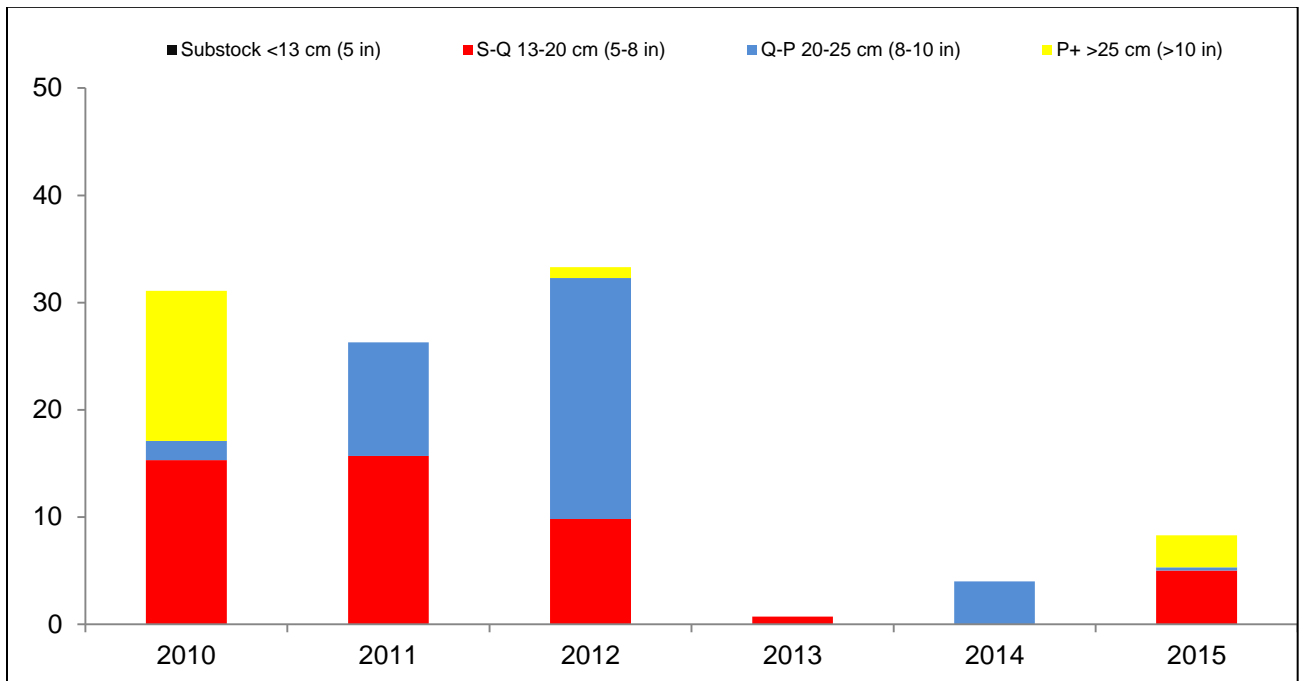
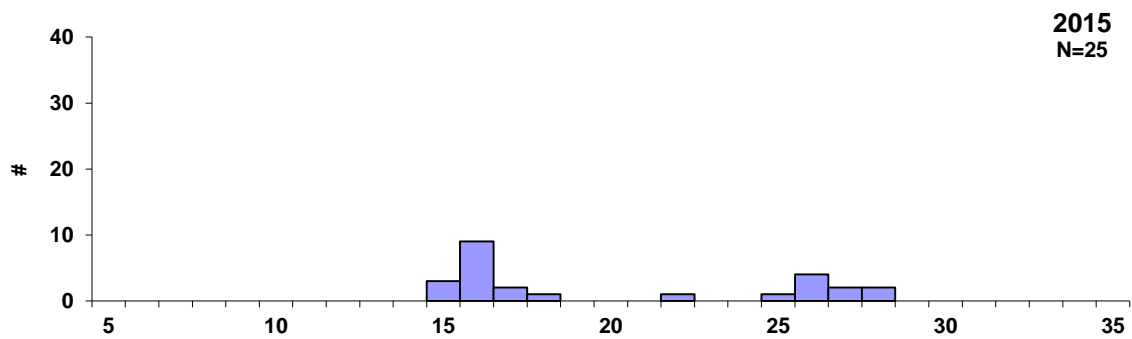
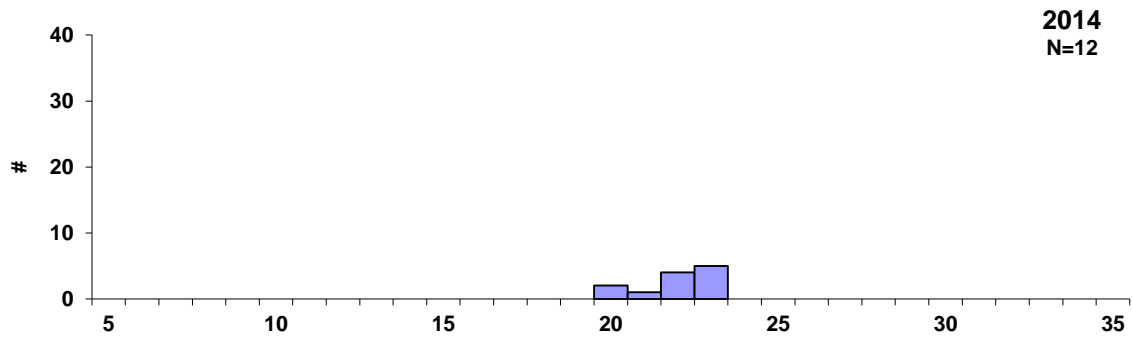
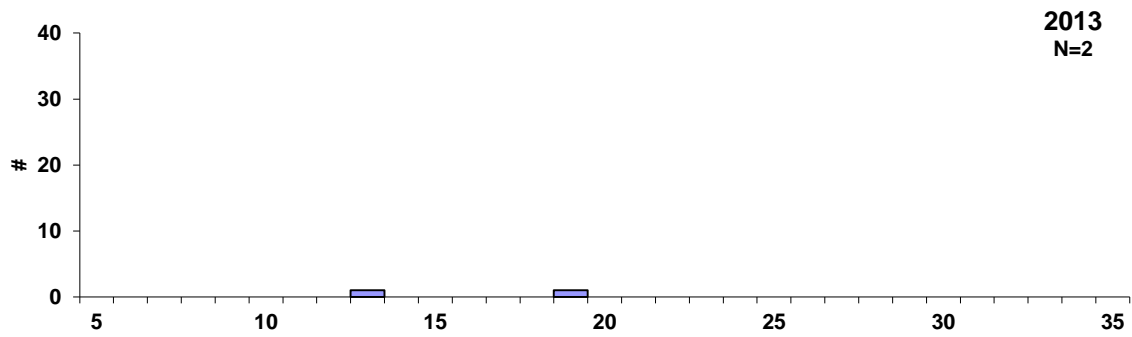
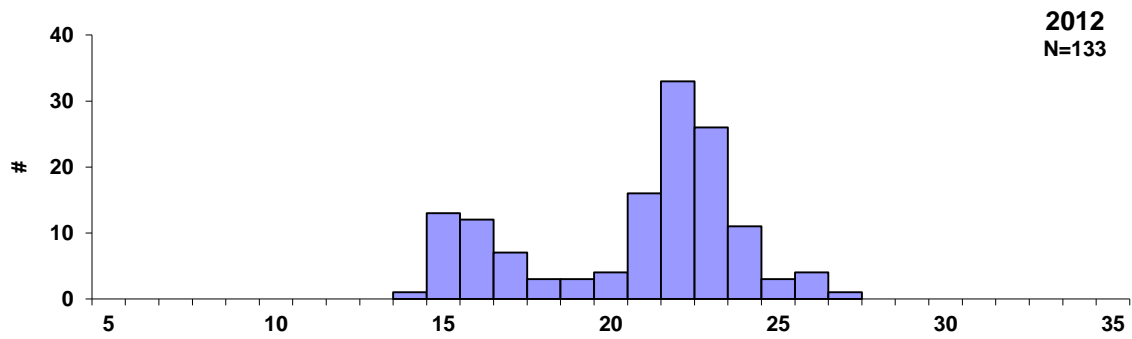


Figure 4. CPUE by length category for yellow perch sampled with gill nets in Lake Herman, Lake County, 2010-2015.



Length-Centimeters

Figure 5. Length frequency histograms for yellow perch sampled with gill nets in Lake Herman, Lake County, 2012, 2013, 2014, 2015.

Lake Herman - Lake county

Map Creation: November, 2002

Sonar Survey: June, 2002

Shoreline: Landsat 7, August, 2000

Lake Area: 1287 acres

Maximum Depth: 13ft

Mean Depth: 4.7ft

Shoreline Development Index: 1.8



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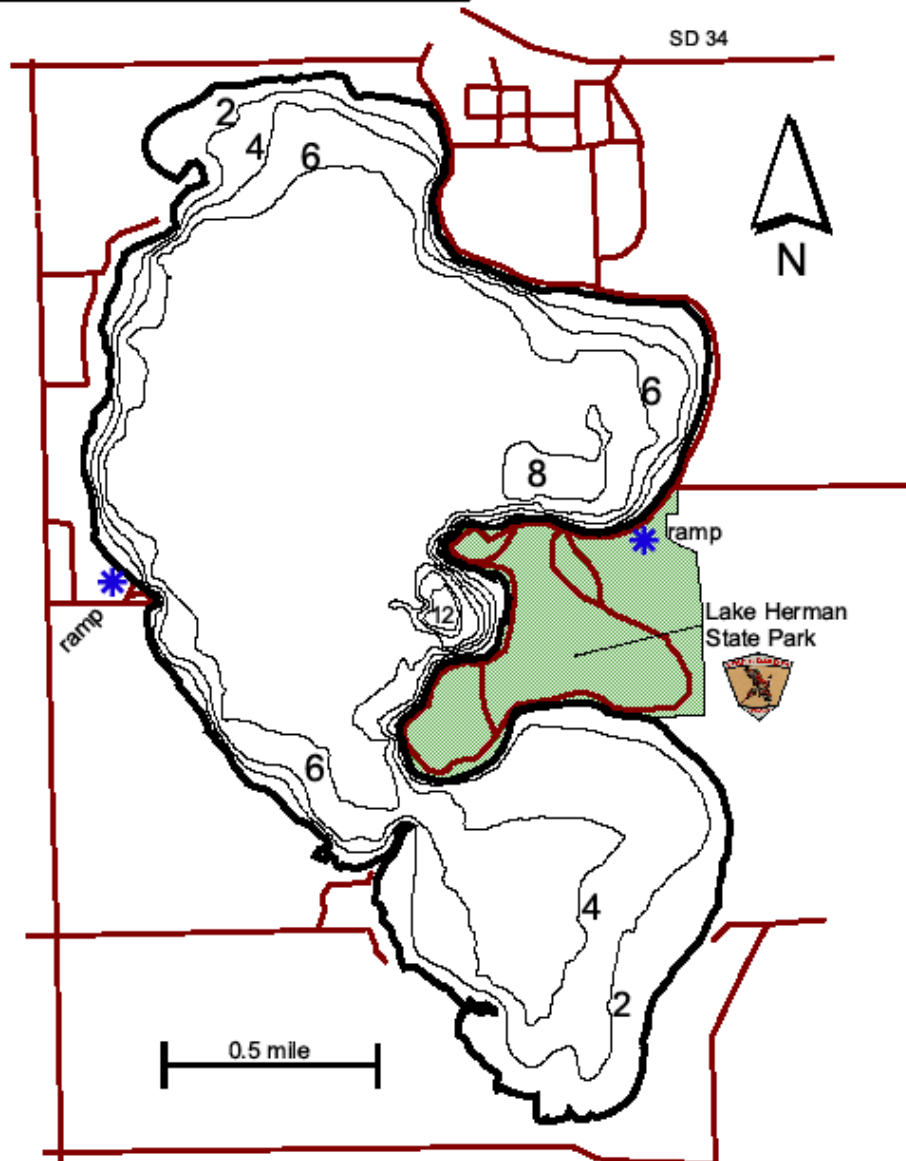


Figure 6. Contour map of Lake Herman, Lake County.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (Inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.